DOCUMENT RESUME

ED 311 979 JC 890 485

TITLE	Matriculation Local Research Options Project.
INSTITUTION	California Association of Community Colleges, Sacramento.; Northern California Community Colleges Research Group.; Southern California Community Coll. Institutional Research Association, Los Angeles.
SPONS AGENCY	California Community Colleges, Sacramento. Office of the Chancellor.
PUB DATE	Nov 89
NOTE	54p.
PUB TYPE	Guides - Non-Classroom Use (055) -- Tests/Evaluation Instruments (160)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	College Admission; Community Colleges; Educational Research; *Program Design; *Program Evaluation; Student Attitudes; Student Educational Objectives; *Student Evaluation; *Student Personnel Services; *Student Placement; Two Year Colleges
IDENTIFIERS	*California

ABSTRACT

Designed to promote institutional research to evaluate matriculation in California community colleges, this document outlines the methodology, anticipated results, and discussion points for nine model research projects. The research projects are designed to assess the effects of matriculation on student performance; on access to education, fairness, and placement programs; and on student satisfaction and goal changes. The nine projects focus on: (1) comparing the academic performance of students who are fully, partially, or not served by matriculation services using a retrospective approach; (2) evaluating student academic success before and after implementing matriculation services; (3) comparing alternative matriculation treatments; (4) assessing the disproportionate impact of assessment and placement programs on student access; (5) evaluating the effectiveness of remedial placement; (6) comparing student success in a history course on the basis of English fluency; (7) determining changes in educational access associated with the implementation of matriculation; (8) monitoring changes in student goals before and after participation in matriculation services; and (9) obtaining feedback from students regarding their use of and satisfaction with matriculation services. For each project, information is provided on purposes, research design, subjects, operational definitions of groups, procedures, results, data analysis, points to cover in study reports, research options, and a contact person for technical assistance. Appendixes contain a glossary and guidelines on sampling. (JMC)

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Matriculation
Local Research Options Project

CALIFORNIA ASSOCIATION OF COMMUNITY COLLEGES

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SOUTHERN CALIFORNIA COMMUNITY COLLEGE INSTITUTIONAL RESEARCH ASSOCIATION

NORCAL COMMUNITY COLLEGE RESEARCH GROUP

November 1989

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Matriculation
Local Research Options Project

November 1989

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Introduction

History of the project

In 1988, researchers in the field began to focus concern on plans for evaluation of matriculation, both at the local and statewide level. During the 1989 Annual Asilomar Research Conference sponsored by CACC, NORCAL, and SCCCIRA, Jon Kangas suggested a strategy for promoting local research and maximizing its benefits. He proposed that as researchers in the field, we should develop a few simple models for local evaluation of matriculation, that we should publish the models and encourage their use wherever appropriate in the state, and that we should compile the results from use of each model in an aggregated report.

The Chancellor's Office wanted to promote local research efforts in evaluating matriculation and was interested in providing technical assistance. Later in the spring of 1989, the Chancellor's Office called together a group of representatives from CACC, NORCAL, SCCCIRA, and the Matriculation Regional Advisory Committee. The group was charged with executing the plan presented at Asilomar by Jon Kangas. This document is the initial work product of the group, and we plan to follow-up with monographs summarizing the findings from colleges' use of each of the models.

Limitations of the project

Simplicity. A paramount concern in the development of the designs that follow was that they be simple. We wanted straightforward studies that were simple to perform, and results that were easily understood by all audiences. We sought designs that could be executed even at colleges with very few resources for research. Nevertheless, to a degree, the strengths of this simplicity are balanced by methodological weaknesses. We acknowledge that the methodology of some of the studies could be improved through more elaborate design or analysis, but such changes would run counter to our goals for the project.

Comprehensiveness. We have not developed a comprehensive or exhaustive evaluation of matriculation. Instead, we have developed a set of tools that are easy to use and fit many local research needs. Our purpose is to promote local research and to aggregate it wherever sensible, but a complete evaluation of matriculation will need to go beyond these models.

Colleges should not assume that completing a few or even all of the designs will constitute a comprehensive and exhaustive evaluation of matriculation. Additional research will be needed, including validation studies of local placement instruments and placement procedures, counts of students by exemption category, and other data as required by the Chancellor.

Legal constraints. The methodology of the designs that follow was constrained by legal advice from the Chancellor's Office. We were prohibited from presenting experimental designs that involved an untreated (or waiting-list) control group and random assignment of subjects to treatment conditions. As a consequence, many of the designs rely on somewhat more complex, yet less powerful quasi-experimental approaches.

The Designs

Models. Each of the designs or studies is presented as a research template or model, and some of them may be adapted for use in your local district. Although you should not change basic features of the design without consulting with the Technical Assistant listed with the study, you may freely adapt the study to varying subject matter. For example, Study 6 might be adapted to study the relationship between *reading level* and *political science* performance. Also, the student satisfaction survey associated with Study 9 will need to be adapted for your local needs.

Strategic suggestion. Since many of the designs have student demographic information (e.g., age, gender, ethnicity, educational goal, etc.) as variables, it would be advantageous to develop a single common data base. This data base could be utilized with the various studies as certain outcome information is compiled. One of the critical variables will be the identification of the "served" and "not-served" matriculants. Attachment 1 in Design 9 provides a survey form that could be used to gather the demographic data referred to in many of the designs.

Technical assistance. We encourage you to contact the Technical Assistants for any of the designs you adopt. The Assistant is available to discuss the study and your plans, and to furnish technical advice on design, execution, data analysis and reporting.

Statistical tests. Tests of statistical significance are *not required* in any of the studies, although they are recommended if sample sizes fall below 100 per group, and because several of the designs do not meet the assumptions for tests of significance. We encourage you to focus your attention on the *practical* and *educational* significance of any differences you observe between groups. If the sample sizes exceed 100 per group, differences that are large enough to have practical importance will typically be statistically significant.

Reporting. As part of accountability, we understand that the Chancellor's Office will be asking you to make available these final reports for the matriculation site review process. However, because our work group plans to prepare a monograph summarizing the findings across the colleges that perform each study, we would like you to submit your findings in report form to the Technical Assistant for each design. We need your help in this endeavor so that we can combine the results of your individual efforts to provide a broad picture. Consistency in reporting format for the studies is extremely important. Please note that the monograph will present aggregated results and will not identify individual colleges.

We suggest that you prepare a report of your work formatted to match the model shown for that design. For many of the designs, we have included sample data tables to exemplify the reporting format. A complete report will include the following sections:

Introduction
- Background
- Research Question(s)

Method
- Design
- Subjects
- Procedure

Results
- (Present data tables)

Discussion

- Interpretation of key results
- Limitations of the study
- Implications for practice
- Suggestions for future research

Appendices. We have included several appendices to assist in the conduct of the studies. Note that the operational definitions are proposed purely for purposes of the current studies; they may differ from definitions used in other contexts. Also, we encourage you to follow the sampling guidelines if possible.

DESIGN 1

Comparing the Academic Performance of Students who are Fully, Partially, or Not Served by Matriculation Services: A Retrospective Approach

This study attempts to answer the following research question: What differences exist in academic performance among students who were fully-served, partially-served, or not-served by matriculation? The purpose of the study is to determine whether receiving varying matriculation services is related to measures of student academic performance.

When comparing differences between groups of students on an outcome measure (e.g., learning performance), the best procedure is to follow the guidelines of an experiment. You would randomly select a sample from the school's population of students. Within this sample, you would then randomly assign its members to one of the designated groupings who are to receive some treatment while others receive none or a placebo condition (i.e., experimental, control). However, the assignment to a control condition is not allowed under matriculation guidelines. An alternative procedure, called a quasi-experimental design, is to allow self-selection into groups. For example, you may not be able to deny any students access to matriculation services (a control condition), but some students probably exist who self-selected or chose to be not-served. Thus, you may use them as controls. The main problem with this design, as it applies to matriculation, is that you usually will not know why students selected to be fully-served or not-served. Thus, if you find differences in outcome measures among the groups, it may not necessarily be caused by the self-selected treatment. In any event, the quasi-experimental design described herein is a viable alternative to the true experiment.

Method

Design

This research design is retrospective, that is, all data are already available. You examine earlier records to determine which services students received and what their subsequent academic performances were. The actual starting time should be a period when students were able to self-select services. The ending time should be at least two terms later, preferably four to six.

You will need matriculation records indicating what services, if any, were received for each student. Permanent student grade records must also be available. Manual searches may be done, but if all such data are on computer file and linked, much time will be saved over manual efforts.

Subjects

Select an earlier academic term when matriculation services were reasonably in place (i.e., admissions, orientation, assessment, and counseling/advisement), and also a time when students were not *required* to receive all services although they would normally be conceptualized today as "non-exempt."

Ideally, the student population from which to select your random sample would be all "non-exempt" freshmen students without prior college experience entering your college during a given academic term. Data Processing records, special rosters, registration dates, or transcripts can be used to help delineate these freshmen from all other students. Should freshmen not be the driving force behind your ADA, select another student group provided that they were also able to self-select matriculation services.

The necessary sample size will vary depending upon the size of the "non-exempt" freshmen population. (See the *Sampling Guidelines* in Appendix B.)

Procure a listing of all "non-exempt" freshmen students and randomly select your sample using a table of random numbers (See Appendix B.) A shorter method (but not quite as good) is to select every Nth name until the necessary sample size has been reached (e.g., population=2000; sample=322; select every 6th name from the defined population).

Operational Definitions of Groups

The *fully-served* group consists of "non-exempt" students who (1) were admitted, (2) received orientation, (3) were assessed before registration, (4) received at least one counseling session before registration, and (5) registered.

Ideally, the definition for the fully served group would also include the filing of an educational plan and enrolling only in courses designated on that plan. Should you be able to track plans and courses enrolled (during the first term), include these elements in your definition. Such a modified definition will affect those definitions which follow:

The *partially-served* group consists of students who (1) were admitted, and received at least one matriculation service (2 through 4) but not all such services, and (5) registered.

The *not-served* group consists of students who (1) were admitted and who received *no* matriculation services (2 through 4) but did (5) register.

Procedure

Having selected the entire sample, consult matriculation and permanent student records to determine into which of the three classification groups each student falls (fully, partially, or not-served). It would be ideal to have close to equal numbers of students in all three groups but this is unlikely. Try to obtain at least 50 students in the smallest group. Should this not happen with the original sample selection, randomly select more cases until the desired number is reached in the smallest group.

Results

Outcome measures and the analysis of the data

Individual academic performances are to be obtained from transcript files. Prepare a data worksheet for easy recording. Many student outcomes may be examined but the essential ones for this study are as follows:

1. *Grade-point Average - First Term.* For each student, record the GPA. To summarize the findings, compute the mean for each group (fully, partially, not-served).

2. *Cumulative Grade-point Average.* For each student, record the cumulative GPA over the time period selected for this study (e.g., 2-6 terms). To summarize the findings, compute the mean for each group.

3. *Successful Rates - First Term.* To summarize the findings, compute the mean "success rate" during the first term for each group (see *Operational Definitions* in Appendix A).

4. *Cumulative Successful Units*. For each student, count the successful cumulative units. To summarize the findings, compute the mean for each group.

5. *Retention Rate - First Term*. For each group, calculate the retention rate (See Appendix A).

6. *Cumulative Retention Rate*. For each group, calculate the cumulative retention rate.

7. *Persistence Rate - First and Subsequent Terms*. Record for each student his/her persistence (see Appendix A). Do the same for subsequent terms covered during the time period of this study. Calculate the persistence rates for each group. Thus, you will have percentages for each group who completed just one term, two terms, etc.

Sample data table

[This table exemplifies the reporting format with fabricated data.]

Table 1

Academic Outcomes of Fully, Partially, and Not-served Matriculants Entering Mountain Community College in Fall 1986

OUTCOME	Fully-Served (N = 110) Mean	Partially-Served (N = 85) Mean	Not-Served (N = 50) Mean
GPA - First Term	2.45	2.14	2.03
GPA - Cumulative	2.63	2.27	2.28
Successful Rate - First Term	83.6%	70.2%	66.7%
Successful Units - Cumulative	38.4	27.6	28.9
Retention Rate - First Term	80.0%	71.8%	70.4%
Retention Rate - Cumulative	76.4%	65.5%	63.9%
Persistence Rate			
Term 1 + 2	84.6%	83.6%	78.3%
Term 1 + 2 + 3	78.3%	71.4%	64.3%
Term 1 + 2 + 3 + 4	69.7%	62.3%	48.2%

Discussion

Suggestions for points to cover in the Discussion Section

1. *Interpretation of the findings*. The primary purpose of this research model is to determine whether the level of matriculation services received is related to student academic performance. It is implied that fully-served students should outperform those receiving fewer or no services. Directly address this point for each of the outcome measures. If no differences between groups are observed (or even a reversal), indicate what you believe might have been the reasons.

2. *Limitations of the study*. As pointed out in the introduction, self-selection into groups has a shortcoming in that you are not likely to determine why students selected as they did. This will limit generalizing about treatment effects. Describe in this section any departure from this design and mention difficulties in execution and analysis as well.

3. *Suggestions for further research.* Students who self-select certain matriculation options may be different in terms of ability and motivation. You may wish to mention a future study along the lines of contacting a sub-sample of each group and discussing why they selected certain services. You may choose to use a mail-out questionnaire for this purpose.

Research Options

1. If entry assessment scores are available for the entire sample, determine if basic skills (mean scores) are approximately the same for the three groups.

2. If you are not familiar with statistics, and you wish to do a refined statistical analysis of group differences, consult a researcher or a statistics instructor before you begin the study. A one-way analysis of variance may be performed on the following variables: GPA (first term as well as cumulative), successful cumulative units, success rates, and retention rates (first term and cumulative). Differences in persistence among the groups may be analyzed using chi-square.

3. Retain the entire data base for long-term analysis or as comparison data for subsequent studies.

Technical Assistance

Contact person for this design:

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Research Coordinator
American River College
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Sacramento, CA 95841

Office - (916) 484-8166 or 484-8427
Home - (916) 273-6449

Available technical assistance includes consultation on design, execution, data analysis, and reporting.

DESIGN 2

An Evaluation of Student Academic Success Before and After Implementing Matriculation

The purpose of this study is to determine if matriculation is likely to have had any impact upon the academic achievement of students. More specifically, the research question is: Have matriculated students earned more A, B, C, or Credit grades than similar students earned prior to implementing matriculation services?

The impact of matriculation upon student academic outcomes may be examined by conducting a retrospective study of a time period when students self-selected their services. Hence, it is possible to compare academic performances of fully-served students against those who received fewer or no services. This approach has also been called a quasi-experiment and is described elsewhere in Design 1.

Another procedure compares student performances pre- and post-matriculation implementation (a before-after design). This approach is described below.

The before-after model compares data from students before matriculation services were in place with another set of data from different students (with similar characteristics) after matriculation was required. Hence, your job is one of gathering current and historical student academic data, all of which already exist. While this design is relatively simple if data are easily examined, it has one serious limitation. If there is a positive change in student outcomes (e.g., post-implementation is better than pre-matriculation), you will *not* be able to claim that matriculation services alone caused the change. The students from the pre-matriculation years may be different in important ways and other aspects of the community college system may have changed - not just the implementation of matriculation. The upshot is that any claims you make must be stated with conservative terminology like, "It would appear that matriculation may be related to changes."

Method

Design

You will need institutional summary counts of student grades from previous academic years. You then convert the sum of the different grade notations into a percentage of all grade notations for a given term. Such data should be available in end-of-term reports from data processing.

It is important to compare similar groups in a before-after design. For example, if only new freshmen have recently been served by matriculation, you would want to compare the grades of that group with grades from other freshmen prior to matriculation. The idea is to compare "apples with apples." Try to capture 4 years of grade data *before* matriculation was implemented at your college. This can then be compared with 1-4 years of post-implementation grade data.

Subjects

Select the student population (or random samples of 200-300 each, see Appendix B) from different years prior to matriculation. Do the same for the post-implementation years. These cohorts should be similar in age and academic experience. It is also necessary to be accurate about the time when matriculation began. If such services were phased in, you will have three time periods, *pre-*, *phase-in,* and *post-implementation.*

Procedure

Collapse data from the academic terms into academic years. Further collapse the successful grade notations against those with nonsuccessful notations (see Appendix A).

Results

Outcome measures and analysis of the data

Take the yearly counts of grades and convert them into percentages as shown below with the fabricated data:

Year	Grade	Count			
1986	A	2,685			
	B	3,270			
	C+ CR	5,370	11,325	=	66%
	D	1,849			
	F	647			
	NC	578			
	W	2,540			
	I	329	5,943	=	34%
	Total	17,268		=	100%

Thus, with these bogus data, 66% of the grade notations were A, B, C, Credit, or "successful." Note that the percentage is based upon total grade notations and *not* upon student headcounts.

Now calculate the same for several years and either graph or table the results as shown below:

Sample data table

[This table exemplifies the reporting format with fabricated data.]

Table 1

Success Rates Over Time

Year	Matriculation Implementation	Success Rate
1983	Pre	62%
1984	Pre	61%
1985	Pre	64%
1986	Phase-in	66%
1987	Phase-in	68%
1988	Phase-in	72%
1989	Post	73%
1990	Post	73%

Discussion

Suggestions for points to cover in the Discussion section

1. *Interpretation of the findings*. Based upon your percentage values, make a determination if there were noticeable changes from pre- to post-implementation periods. Also, note other important events like economic changes, shifting student demography, or increased rigor in

courses due to Title 5 changes. Use conservative language in your report as previously noted. If no changes were observed, indicate some reasons why.

2. *Limitations of the study*. As indicated previously, the before-after design does not isolate the efforts of matriculation from all other variables. Should there be changes from pre to post periods, it may be a function of other variables, not necessarily matriculation. The before-after approach can be improved substantially by adding a control group (no matriculation services received during pre and post periods), but such controls are not allowed under matriculation guidelines. Remember to make conservative claims.

3. *Suggestions for further research*. In your report you may want to include such suggestions as they become apparent after having done this study. Research should answer the question posed, but it will likely raise several other unanswered questions.

Research Options

1. If computer resources are available, you can further refine the successful grade notations to include only those coming from selected cohorts (e.g., gender or ethnic groups).

2. Select certain courses and compare the pre- and post-matriculation successful grade rates.

Technical Assistance

Contact person for this design:

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Available technical assistance includes consultation on design, execution, data analysis, and reporting.

DESIGN 3

An Experimental Comparison of Alternative Matriculation Treatments

This design is aimed at the following research question: Is one matriculation method more effective than another? The purpose of the study is to use the traditional experimental methods of the behavioral sciences to evaluate and compare the effectiveness of alternative matriculation treatments. The study can be used to compare two completely different matriculation programs; alternatively, it can compare different versions of one or more specific components (e.g. new orientation vs. old orientation, group vs. individual counseling).

Questions about cause and effect are best answered by experimental studies involving random assignment of subjects to alternative treatment conditions, and that is the approach described in this proposal. Indeed, random assignment to treatments is a key assumption of the inferential statistics generally used to evaluate experimental findings in the behavioral sciences.

The ethical concerns sometimes associated with random assignment to an untreated control group are not relevant to this design proposal. Here, no students are denied matriculation services; instead, two promising alternatives are compared, with the aim of discovering which is more powerful.

Because it uses random assignment of students to treatments, this design cannot be conducted as a retrospective study using existing data. Accordingly, plans for treatment of students and gathering of data must be developed before matriculants are served.

For most institutions, the bulk of the required data for each student will be available from college data processing services.

Method

Design

The experiment will follow a between-groups experimental design with students assigned randomly to either a matriculation method A or B. Outcome measures will include first term success rates and course retention rates together with second-term success rates and persistence for each student.

Subjects

At least 200 students will participate in the study. (Guidelines for sampling are provided in Appendix B.) These students will be drawn from the general population of non-exempt students. At some colleges, a larger sample would permit breakdown of results by ethnicity.

Procedure

The students who will participate in the study must be identified *in advance of the delivery of matriculation services* (other than the application component).

Each student in the study sample will be assigned *randomly* to receive matriculation method A or B. These methods might differ in a single component (e.g., group counseling vs. individual counseling, new vs. old orientation) or they might involve differences throughout the entire program. Each participating student should receive a note of explanation that might be worded as follows:

We are evaluating our procedures for new students. As part of this evaluation, different students may complete somewhat different procedures. For you, [orientation (or) counseling] will involve... [describe as appropriate].

Demographic and outcome data for each student will be collected at a time and in a manner most convenient for the participating college.

Results

Description of the sample

For each student, gender, ethnicity, and other salient descriptive data will be recorded.

Outcome measures

For each student, the following measures will be computed:

First-term success rate
First-term course retention rate
Second-term success rate
Second-term persistence rate

Each of these measures is defined in the attachment *Operational Definitions* in Appendix A.

Analysis of the data

The first-term mean success rate and mean retention rate will be computed for each group. The mean second-term success rate will be computed for each group. Finally, the frequency and percentages of students in each group who drop out or persist to the second term will be computed.

Differences in group means and frequencies will provide the most important findings to interpret. Are these differences large enough to be educationally important? The practical significance of the group differences is more important than their statistical significance. Indeed, as long as the sampling yields at least 100 subjects per group and the differences in group means and frequencies are large enough to be educationally important, tests of statistical significance may be considered optional. Tests of significance and other optional statistics are discussed briefly in the **Study Options** section.

In addition, the gender, ethnicity, and other descriptive characteristics of the entire sample will be represented in frequency distributions. These data will permit comparison of the characteristics of the study sample to the known characteristics of the general student population.

Sample data tables

[These tables exemplify the reporting format with fabricated data]

Table 1
Mean First-Term Course Success Rates

Method A Group = 67%
Method B Group = 64%

Table 2
Mean First-Term Retention Rates

Method A Group = 65%
Method B Group = 69%

Table 3
Mean Second-Term Course Success Rates

Method A Group = 72%
Method B Group = 75%

Table 4
Observed Frequencies of Persistence to Second Term by Group

		Outcome: Persisted	Outcome: Dropped
Method	A	93 (62%)	57 (38%)
	B	72 (48%)	78 (52%)

Discussion

Suggestions for points to cover in the Discussion section

1. *Interpretation of the findings.* What do the results mean? It is especially important to discuss the practical and educational importance of any observed differences between groups. Are the differences in effects of the methods great enough to justify the differences in resource expenditures?

   Results like the fabricated data shown above might indicate that Methods A and B produce roughly equal course success and retention, yet Method A yields greater persistence to the second term.

2. *Limitations of the study.* If the study sample was not typical of the general population, describe the differences and caution the reader to limit generalization of the findings to similar students. Describe any departure from the design proposed herein. Mention any difficulties that occurred in execution of the study and describe how these may have affected the findings.

3. *Suggestions for further research.* In view of the results, what additional research seems to be needed? One likely suggestion would be choice of a two-factor design, crossing treatment with ethnicity in order to determine whether the differences between methods A and B are similar for all groups.

Study Options

1. Tests of statistical significance may be useful if the observed differences between groups are small, or if sample sizes fall below 100 per group. Differences in group means may be tested with one-tailed *t*-tests using the .05 level of significance and the differences from expected frequencies will be tested with chi-square at the .05 level of significance. Computational procedures for *t*-tests and chi-square are described in any introductory college-level statistics text.

   Even if tests of significance are not performed, differences in group means may be interpreted more easily if the standard deviation is computed for the success and retention rates of each group. The differences between group means that are attributed to matriculation effects can then be compared to the natural variation in student performance found within each group.

2. An option that would enhance the information value of the proposed study is to perform a two-factor design, crossing treatment with ethnicity. With this approach, there would be a method A and method B group for each ethnic category, with students assigned randomly to these "cells". Each cell should contain *at least* 30 students and tests of statistical significance will be required unless all cell frequencies exceed 100. Two-way analysis of variance may be used, reporting cell means, as well as *F*-ratios, degrees of freedom and probability levels for the effect of method, ethnicity, and the method by ethnicity interaction.

3. Another variation involves use of existing data for a retrospective comparison of alternative matriculation programs or components. For example, your college might have changed its orientation program recently and might have the necessary student outcome data on file for samples of students from before and after the change.

   Because of its relative ease, this sort of study appears attractive, but compared with the power of an experimental design involving random assignments to treatments, *the power of this design is weak*. With this sort of retrospective study, no causal attributions can be made. If students who completed the new orientation perform better, it is not clear whether that difference is attributable to the new orientation or to other changes that accompanied its introduction (e.g. increased staff enthusiasm, increased funding for matriculation that lead to generally improved services, changes in enrollment patterns, etc.). Further, traditional tests of statistical significance are inappropriate because the assumption of random assignment is violated in this design. This design is a weak second choice that should be used *only* if random assignment to treatments is impossible, even for a limited sample of students.

Technical Assistance

Contact person for this design:

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Hayward, CA 94545

(415) 786-6698

Available technical assistance includes consultation on design, execution, data analysis, and reporting.

DESIGN 4

Disproportionate Impact and Writing Assessment

This design is aimed at the following research questions: 1) Does a disproportionate impact occur between testing and entrance into remedial courses? 2) Does a disproportionate impact occur between remedial coursework and subsequent college-level coursework? The purpose of the study is to organize testing, placement, and enrollment data in such a way that it is possible to see the impact on ethnic groups as they go through the testing, placement, and enrollment process.

This is a retrospective study for colleges that have access to test scores broken down by ethnicity and for colleges that are able to distinguish between AA-applicable English and ESL writing courses and NonAA-applicable English and ESL writing courses. This study only addresses the ethnic variable and writing assessment. However, the model can be used to do an analysis of the impact of other assessments (e.g., reading) in relationship to other variables with civil rights implications, such as sex or disability.

Both Federal Civil Rights Laws and the Title 5 Assessment Regulations ask us to address issues of disproportionate impact. If an ethnic group is represented in basic skills courses in a significantly different proportion than in the tested group, we are asked to be sure that the test is a valid one. Data are included in this study indicating the proportions of ethnic groups qualifying for remedial courses to further clarify what is happening in this process.

If an ethnic group is represented in college-level courses after basic skills coursework in a smaller proportion than other ethnic groups, a disproportionate impact is said to occur and colleges are asked to explain why this has occurred and to develop and implement appropriate intervention strategies to correct the situation.

Method

Subjects

Tested population (Table 1, Column 1): Students who were tested for writing placement in either English or ESL between May 1, 1988 and October 1, 1988, and who first enrolled at this college in Fall 1988 should be included in the study and will be referred to as the "Tested" population. The ethnic composition of this group should then be determined. Ethnic categories are defined in Appendix A, however, each college may use an expanded version for local needs.

NonAA-placed (Table 1, Column 2): The "Tested" population should be broken down into two groups: those who qualified for nonremedial writing and those who qualified for remedial writing (including ESL writing) based on the results of the placement test. The remedial group should then be broken down into its ethnic groupings and will be referred to as the "NonAA-Placed" group.

NonAA-enrolled population (Table 1, Column 3): Next determine who, of the Tested population, enrolled in NonAA-applicable English or ESL writing courses for Fall 1988. Then break this group down into its ethnic groupings. This group will be referred to as the "NonAA-enrolled" population.

NonAA-persisters (Table 1, Column 4): Next, determine which of the NonAA-enrolled population persisted to the next term and took one or more AA-applicable courses. Then break this group down into its ethnic groupings. This group should be referred to as "NonAA-persisters." Persistence is said to exist if the student had any grade on his/her subsequent term transcript (see Definitions in Appendix A).

Results

Sample data tables

[These tables exemplify the reporting format with fabricated data.]

The following table indicates the number and percent of students by ethnicity in the Tested, NonAA-placed, NonAA-enrolled, and NonAA-persisting groups.

Table 1

Number and Percent by Ethnicity of Tested, NonAA-placed, NonAA-enrolled and NonAA-persisters

	Col. 1 Tested		Col. 2 NonAA-Placed		Col. 3 NonAA-Enrolled		Col. 4 NonAA-Persisters	
Ethnic Group	N	%	N	%	N	%	N	%
Group 1	800	20%	500	25%	360	30%	320	40%
Group 2	800	20%	500	25%	360	30%	160	20%
Group 3	1200	30%	500	25%	240	20%	80	10%
Group 4	1200	30%	500	25%	240	20%	240	30%
Total	4000	100%	2000	100%	1200	100%	800	100%

Table 2 indicates the percent difference between Tested, NonAA-placed, NonAA-enrolled and NonAA-Persisters.

Table 2

Percentage Differences between Tested, NonAA-Placed, NonAA-Enrolled, and NonAA-Persisters

Ethnic Group	% Diff. Col. 1&2*	% Diff. Col. 2&3	%Diff. Col. 3&4
Group 1	+25%	+20%	+33%
Group 2	+25%	+20%	-33%
Group 3	-17%	-20%	-50%
Group 4	-17%	-20%	+50%

*Column numbers refer to those used in Table 1 above. An example calculation using Group 1, Column 1 and 2 is as follows: Column 2 (25%) - Column 1 (20%) = +5% divided by Column 1 (20) = +25%.

Comments

1. Comment on percentage differences in ethnic composition of Tested and NonAA-placed groups.
2. Comment on percentage differences between the NonAA-placed and NonAA-enrolled groups.
3. Comment on percentage differences between the NonAA-enrolled and NonAA-persisters.

Discussion

Suggestions for points to cover in the Discussion section

1. *Interpretation of the findings.* Differences between Tested and NonAA-placed populations. Are the proportions different between these two groups? Why is there a difference? What factors may relate to a particular ethnic group having a higher or lower proportion that qualify for remedial courses? Are there any questions of test validity that need to be raised?

   Differences between NonAA-placed and NonAA-enrolled populations. Do the various ethnic groups enroll in remedial courses in different proportions than they qualified for remedial courses? What factors may relate to differences if they exist? Are there limitations in certain sections of remedial courses that may impact one ethnic group more than another? Do different ethnic groups go through different assessment processes that may result in their being more apt to enroll into remedial courses than other ethnic groups?

   Differences between NonAA-enrolled and NonAA-persisters. Did the group of NonAA-enrolled students persist to the next term in different proportions than they existed in the NonAA-enrolled group? If differences exist, why might they be there?

2. *Suggestions for future research.* Further research typically will be needed to determine why any particular difference exists. You might suggest that analyzing differences based on the original level of writing may shed some light. You might want to suggest calculating the proportion of remedial to non remedial units taken by the NonAA-enrolled and the NonAA-persisters to see if the NonAA-enrolled students are in fact taking a greater proportion of AA-applicable courses over time.

Technical Assistance

Contact person for this design:

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San Jose/Evergreen Community College District
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(408) 270-6466

Available technical assistance includes consultation on design, execution, data analysis, and reporting.

DESIGN 5

Evaluating the Effectiveness of Remedial Placement

The Matriculation Bill, AB 3, requires evaluation of the success rate of students who enroll into recommended courses compared to students who choose not to follow colleges' advice. The purpose of this study is to compare the performance and persistence of students who enrolled into and completed the recommended remedial reading course with students who did not enroll into the suggested course. The research question addressed is: Does successful completion of recommended remedial reading coursework assist students in their performance and persistence in college?

This study can be conducted retrospectively utilizing existing college data. Students' initial placement information will need to be available in addition to student historical transcript records. This design is based on the supposition that students who completed the assessment component and received information on their placement were apprised of the college's recommendations regarding remediation either through a group interpretation of placement results during orientation or a counseling session. This design could be used in evaluating the effectiveness of any remedial or developmental course, provided recommendations regarding remedial class enrollment were made to students.

Method

Design

The study will consist of two groups: the advice followers and the non-followers of advice. The measures of student success will include the percent of units completed satisfactorily during their first term and students' persistence and performance in the following term.

Subjects

The students will be those assessed and placed into the highest level of remedial reading. The sample to be studied should include only those students who participated in the college's matriculation activities (i.e., admissions, assessment, orientation and counseling/advisement) during a set period (e.g., Fall 1988). A minimum of 200 students should be included in the study. The sample should include nearly the same number of students placed into the specific level of remedial reading who enrolled in the course and students who were placed into the same level of reading but did not enroll in the reading course. Sampling techniques could be utilized (see *Sampling Guidelines* in Appendix B). To determine the population size, it will be necessary first to identify the number of students assessed and placed into the highest level of remedial reading who also participated in the matriculation program.

Procedure

This study is best undertaken by schools who can identify their "served" matriculants and can easily match placement results to students. It would be advantageous for transcripts to be "on-line," however, it is not necessary. If the number of students in each group could be expanded, it would allow for a more detailed breakdown of results to include an examination of the interaction of ethnicity, age, gender, and educational goal upon "advice following behavior" regarding remediation and subsequent student performance and persistence.

Results

Outcome measures

Each student's success rate (see Operational Definitions in Appendix A) will be calculated for all courses during his/her first term. Additionally, the following term persistence (see Definitions) for each student will be noted. The student's success rate for the following term will also be determined. Students who enroll in the recommended remedial reading class during their second term should be identified as such.

Analysis of the data

The Advice Followers group should be further divided into those who successfully completed (CR,"C"or better) or one or more units of the remedial reading course and those who did not. The mean success rate should be calculated for each of the three groups. (Advice Followers-Course Completers and Course Non Completers and Non-advice followers.) The percentage of each group who persisted to the next term should be calculated (Persistence Rate - see Definitions). After the conclusion of the second term, the mean success rate should be calculated for each of the groups.

Description of the sample

If sampling techniques were utilized, gender, ethnicity, age, and other descriptive characteristics of the entire sample should be represented in frequency distributions. These data will permit comparisons of the study sample to the known characteristics of the general student population.

Sample data table

[This table exemplifies the reporting format with fabricated data.]

Table 1
Success and Persistence of Remedial Advice Followers and Non-Advice Followers

GROUPS	Number of Students	OUTCOMES: 1st Term Mean Success Rate	Mean Persistence Rate to Following Term	Following Term - Mean Success Rate
Remedial Students-Advice Followers:				
Course Completers	180	72%	78% (140)	78%
Course Noncompleters	85	53%	49% (42)	54%
Remedial Students-Non-advice Followers	237	66%	51% (120)	63%

Discussion

Suggestions for points to cover in the Discussion section

1. *Interpretations of the findings.* What relationship does remediation have with increasing students' ability to succeed in their coursework and persist in the pursuit of their educational and vocational goals? The remedial classes in which the students were placed are being scrutinized for their effectiveness in better preparing students for college-level coursework. However, since performance of students who choose to follow advice or not is being measured, there is a strong possibility that the findings may reflect other contributing characteristics inherent in advice followers and non-advice followers.

2. *Limitations of the study.* If the assessment and placement program has not been evaluated, student placements may not be valid and therefore reflect a misleading need for remediation. Students may not take the assessment process seriously and put forth their best effort, thereby contributing to inaccurate placement.

   If possible, identify the students who were advised to enroll into remedial reading classes, but were unable to do so due to lack of availability of the class.

   If modifications to the design were incorporated during implementation of the study, please identify what they were. Describe any difficulties that may have arisen during the course of the study and what impact they may have had on the results.

3. *Suggestions for further research.* Upon reflection of the results and the study, what variations to this type of investigation appear to be necessary?

Study Options

1. One variation that may contribute to the usefulness of the findings is to identify the success rate of the three groups for units that had transferable status.

2. These three groups of students could be flagged and tracked over succeeding terms to determine the long-term impact of following advice and consequent successful completion of remedial coursework. The groups would need to be controlled for later completion of remedial coursework. The length of time required for students in the groups to complete an Associate Degree or transfer to a four-year institution could be calculated.

3. Students who enroll into six (6) or more units and indicate an educational goal of earning an Associate Degree or transferring on to earn a Bachelor's Degree could be identified and analyzed separately. This would limit the ability to generalize results to the entire population; however, it would focus on a targeted group. The value of remediation and tendencies to follow advice could be examined as it affects the performance and persistence of these students.

4. Include other pertinent demographic variables such as ethnicity, age, and gender to identify other factors contributing to students' advice-following behavior and value of remediation.

Technical Assistance

Contact person for this study:

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Available technical assistance includes consultation on design, execution, data analysis, and reporting.

DESIGN 6

History Course Success Based On English Eligibility

The legislative intent in AB3 and its guidelines for assessment and placement speak to a desire to guide students in determining and understanding the skills needed for programs and coursework. In presenting the Title 5 Regulations, the September 1989 Board of Governors' document speaks of matriculation as "a program essential to and interrelated with the provision of basic skills instruction and rigorous course standards necessary to ensure student access and success." The goal then of combining assessment, placement, and counseling is to aid the student in developing a comprehensive plan to achieve a particular educational goal based on his or her interests, abilities and desires.

This design will evaluate the viability of using student results from English language skills assessments, or English writing course completion for placement into other collegiate level coursework. More specifically, this effort will review student success in the introductory U.S. History transfer course as it relates to his/her English language course eligibility and/or completion.

This study is designed for colleges that: 1) have an English placement procedure based on student performance on standardized tests and/or college coursework; 2) have completed Title 5 (strengthening standards) activities in the History department; and 3) either do not have a prerequisite policy restricting entry into the History class, or restrict only a minimum number of students.

This study may be done either retrospectively or prospectively. Because the project requires two semesters of data, it is recommended that you do this study retrospectively. It may be helpful to review several semesters to insure that patterns are constant. Technical support from data processing staff will be helpful. It will be necessary to match students to their assessment/placement levels and previously completed coursework.

Method

Design

All students fitting the subject criteria should be considered. The data to be gathered include:

> U.S. History grades for students who entered the college in the Fall 1988 term; their English language placement level based on assessment; *and/or* their English writing class with successful grades (CR, "C" or better) from the Fall 1988 term organized by exiting placement level; and additional demographic variables: gender, ethnicity, and age.

Subjects

Subjects for this study would include all students enrolled in U.S. History as of the first census in the Spring 1989 term. In consideration of possible writing skill development of students due to time lapse between skills assessment or general course enrollment and enrollment into the U.S. History class, only first time students new in Fall 1988 should be included in the study.

Procedure

It is strongly recommended that assistance from the college's data processing department be obtained to construct the student data files and initial comparison tables. Trying to do the project manually would be very difficult. Due to the study limitations and because of the phasing in of Title 5 standards, schools may choose to review previous groups matching the same sample limitations, noting when curriculum modifications took place. Data processing should be able to produce the comparison data shown in Table 1 of the Results section.

A separate data file should be created for each term studied. All files can be combined if the distributions of the outcome measures (success rates) look very much the same from term to term. If not, they should be analyzed separately with attention to reasons for the variation.

Results

Outcome measures

The student's success in U.S. History is the outcome measure, and a positive relationship between level of English eligibility and history success is expected.

A table of the percentage of students with successful completion of the history course (see *Operational Definitions* in Appendix A) by each level of English will be compiled (see example below). Tables for each semester and subgroup populations can be developed to illustrate the relationship between English skill levels and history success.

Sample data table

[This table exemplifies the reporting format with fabricated data.]

Table 1

Percent of Students Achieving Successful U.S. History Grades by English Level based on Assessment Scores

English Level*	% Successful in History
English 1A	75%
English 1LB	65%
English 2 LB	30%
English 3 LB	25%
English 4 LB	10%

* "LB" stands for level below Freshman Composition.

Table 2
Percent of Students Achieving Successful U.S. History Grades by English Level based on Prior English Course Completion

English Level**	% Successful in History
English 1A	85%
Engish 1LB	65%
English 2LB	50%
English 3LB	30%
English 4LB	20%

** Students have successfully completed English courses at these levels.

Discussion

Suggestions for points to cover in the Discussion section

1. *Interpretation of the findings.* Does English placement or the completion of an English course "predict" success in the history course? The percentages of successful students at each level of English should provide evidence for the establishment of an appropriate prerequisite level for U.S. History.

2. *Limitations of the study.* Even though some colleges have prerequisites for U.S. History in place, they may be advisory at this time or they may be quite low. In this case, you can undertake this project if there is a limited number of students restricted from enrolling into the U.S. History course.

   ESL writing courses considered to be at the same level as English courses must initially be considered separately. If there are multiple paths of entry into the English courses, such as different tests, coursework, high school transcripts, etc., additional subgroups for the independent variable (English level) should be considered.

   Instructor, content, and grading variations can significantly influence student outcomes. Different standards and different text reading levels are clearly part of the "treatment" we call education, yet frequently defy analysis. Participating colleges should strive to make their sample representative of their student population while endeavoring to insure that the course treatment (in both English and History courses) is as homogeneous as possible.

Study Options

1. The calculation of a chi-square between the variables can verify a statistically significant relationship.

2. Another basic variation of this project is to compare the actual English grades to the U.S. History grades. Variations in grading standards will likely be highlighted.

3. Additional variations of this project require considerable data processing support and statistical analysis. A more rigorous analysis of factors available through utilizing student demographics data could be undertaken.

Technical Assistance

Contact person for this design:

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DESIGN 7

Student Access and the Implementation of Matriculation

The purpose of this study is to determine the impact of required matriculation activities upon student access and enrollment in your community college. The issue of access may be considered at different points in time; from community populations to applying for admission, or from application to actual registration. This study will focus on access during the time period from *application submitted* to *registration for classes*.

The research questions posed by this study are:

1. Have matriculation activities (i.e., admissions, orientation, assessment, counseling/advisement) made any difference in overall application-to-registration rates?

2. Have required matriculation activities (i.e.admissions, orientation, assessment, counseling/advisement) created any disproportionate impact on ethnic groups in admissions-to-registration rates?

Method

Design

This approach will examine the percentage of new, non-exempt applicants who subsequently registered for classes. Data must be broken down by ethnicity and by different time periods representing pre-, phase-in, and post-matriculation implementation. As such, the design will require centralized data processing assistance. Colleges participating in this design will need to have maintained records of applicants who did not register for classes.

Subjects

Several terms of all new freshmen applicants (submitted applicati ns) who would be considered as "non-exempt" will comprise the population for this study. It will also be necessary to establish three time periods: 1) two-four academic terms before implementing matriculation; 2) phase-in terms (if applicable); and 3) two-four terms after required matriculation activities were firmly in place. All new freshman applicants for each of these terms must be identified and their ethnicity established. A later census count will *not* be appropriate. It is presumed that during the post-implementation terms, all such students received orientation, assessment, and at least one counseling session before being allowed to register for classes.

Procedure

The new freshman applicant group and their ethnicities (see *Operational Definitions* in Appendix A) will be identified for each term during the pre-, phase-in, and post phases of matriculation. The exact manner in which this is done will depend upon data processing procedures. You will only need summary counts of students rather than individual identities. Of course, if you wish to do follow-ups with nonregistrants, you will need names, identification numbers, or other means in order to identify these students.

Results

Analysis of the data

Prepare tables like those shown below for each term during the three phases of implementation (pre-, phase-in, post).

After having put together several such tables representing the pre-, phase-in, and post-implementation terms, you may compute an average percent for each group representing each time period (average of pre-, average of phase-in, average for post-). An example of this is presented as Table 3. The variation in initial (pre-) percentages should help you to establish a reasonable baseline for each ethnic group. The question to address is: Has the rate changed since implementing matriculation?

Assume that the sample data in Tables 1 and 2 now represent composite percentages as portrayed in Table 3. First of all, did required matriculation activities make a difference in overall admissions-to-registration rates? The values to compare are 99.48% (before matriculation) with 98.83% (post-matriculation). The difference of 0.65% is small and may merely reflect routine changes. On the other hand, if *each* pre-implementation period is around 0.65% higher than each post-implementation period, this might suggest that required matriculation activities do affect registration. It would then be important to contact some of those individuals who do not register as a follow-up.

Secondly, you need to determine if the required matriculation activities created any disproportionate impact on ethnic groups. Assuming Table 3 represents averages of more than one term, you will note there is very little difference except for Hispanics (99.48% pre-to 96.30% post). The difference of 3.18 percentage points may very well signal a differential impact. The finding could be further examined by conducting short interviews, focus groups or surveys.

Sample data tables

[These tables exemplify the reporting format with fabricated data. Additional ethnic categories are optional.]

Table 1
Application to Registration Rates for Selected Student Groups During Fall 1986 Semester (A Pre-Matriculation Term)

Group	Total Applicants	Total Registered	% Applicants Who Registered
Asian	4,300	4,295	99.88
Black	5,600	5,542	98.96
Hispanic	6,358	6,325	99.48
White	5,800	5,786	99.76
Other	442	435	98.42
Totals	22,500	22,383	99.48

Table 2
Application to Registration Rates
for Selected Student Groups During Fall 1990 Semester
(A Post-Matriculation Implementation Term)

Group	Total Applicants	Total Registered	% Applicants Who Registered
Asian	4,480	4,470	99.78
Black	5,750	5,733	99.70
Hispanic	6,480	6,240	96.30
White	6,200	6,193	99.89
Other	642	640	99.69
Totals	23,552	23,276	98.83

Table 3
Composite Table Showing Averages of Applicants to
Registrants Percentages

	Average Percents During Matriculation		
Group	Pre-	Phase-In	Post-
Asian	99.88	99.75	99.78
Black	98.96	99.32	99.70
Hispanic	99.48	97.63	96.30
White	99.76	98.42	99.89
Other	98.42	99.36	99.69
Overall	99.48	98.96	98.83

Discussion

Suggestions for points to cover in the Discussion section

1. *Interpretation of the findings.* Small ups and downs in the percentage values probably represent nothing more than routine variation. Consistent directional differences would likely indicate otherwise. Discuss where any differences exist and include likely plans for finding out why this occured.

2. *Limitations of the study.* Any "before-after" design using different students at different times without utilizing a control group allows for much interpretation should differences be noted. Were there other changes occurring in addition to the implementation of matriculation? Could any of these have affected the percentage of applicants to registrants? This type of data indicates *what is* but not *why*.

3. *Suggestions for further research.* Should differences exist, you will need to address the *why* with follow-up studies. Describe in this section what type of studies are anticipated.

Technical Assistance

Contact person for this design:

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Home: (916) 273-6449

Available technical assistance includes consultation on design, execution, data analysis, and reporting.

DESIGN 8

Monitoring Changes in Student Goal Before and After Matriculation

This design is aimed at the following research question: Do students change or clarify their goal after participating in assessment, orientation, and counseling/advisement?

The matriculation process was conceived to help students clarify their educational goals and to develop a plan to reach those goals. A more efficient use of educational resources is one desirable outcome of this process. Greater retention of students is also hoped to follow when students have a clear vision of their goal(s).

This study can best be conducted by colleges that have their matriculation process structured in such a way that students can indicate their primary educational goal at the time of admissions and then again during, or immediately after, their counseling appointment. Since most colleges do not have this type of student goal information already collected, this design cannot be conducted as a retrospective study using available data.

Method

Design

Admissions Goal.
The educational goals used in the MIS dictionary as SB14 should be used during the admissions process. At the time of admissions, the student should indicate his or her primary goal. This goal will be referred to as the "admissions goal." If your college has not begun using these goals, an alternative method for collecting students' "admission goals" will be necessary. One suggestion for gathering these goals is to give each new nonexempt student, along with the usual admission materials, a separate sheet with admissions goals listed. The sheet should have a place for the student's name, social security number, and a list of the admission's goals. The student should indicate his or her primary goal on this sheet.

Matriculation Goal.
The educational goals listed in the MIS Dictionary as SMO1 should be used in the counseling process and will be referred to as the "matriculation goals." SB14 and SMO1 are identical and can be viewed as a pre- and post test taken before and after the matriculation process. Clarification of goals made during the process of matriculation should be reflected in goal changes between SB14 and SMO1. It is suggested that students clarify their admissions goal in the context of their counseling appointment. A sheet identical in content to the one used to collect the admissions goal should be used.

The goals to be used in the study are SB14 and SM01 as follows:

Obtain a bachelor's degree after completion of an associate's degree. - BA & AA
Obtain a bachelor's degree without completing an associate's degree. - BA w/o AA
Obtain a two-year associate's degree without transfer.- AA w/o Transfer
Obtain a two-year vocational degree without transfer. - Voc. AA w/o Transfer
Earn a vocational certificate without transfer.- Cert. w/o Transfer
Discover/formulate career interests, plans, goals. - Discover Interests
Prepare for a new career (acquire job skills). - Prepare Career
Advance in current job/career (update job skills).-Advance Career
Maintain certificate or license (e.g., Nursing, Real Estate). - Maintain Cert./Lic.
Educational development (intellectual, cultural). - Educ Dev.
Improve basic skills in English, reading or math.- Improve Bas.Sk.
Complete credits for high school diploma or GED. - Complete H.S. units
Undecided on goal. - Undecided

Subjects

In order to have sufficient numbers for each educational goal to determine meaningful changes, it would be preferable if all students who qualified to go through the matriculation process were asked to indicate an admissions goal and a matriculation goal. Only those students who did indicate both an admissions goal and a matriculation goal should be used in the study.

If you cannot have all matriculated students fill out their goals, and you want to scale back the number of students who complete the goal sheets, ask for technical assistance.

Results

Analysis of the data

The admissions goal sheets should be matched by name and social security number to the matriculation goal sheets. Only use data for students who have both an admissions and a matriculation goal. Use a grid similar to Table 1 and place a mark in the cell that corresponds to the admissions goal and matriculation goal for each student. If the goal is the same for both, the mark will always appear in one of the diagonal cells.

Sample data tables

[The tables exemplify the reporting format with fabricated data.]

Table 1 reflects the number of those students who indicated a particular admissions goal and then chose the same or different matriculation goal.

Table 2 reflects the percent of students who chose a particular admissions goal and then chose the same or different matriculation goal.

Table 1

Number of Students Who Choose an Admissions Goal Who Later Choose a Matriculation Goal

Admissions Goals	Matriculation Goals: BA & AA	BA w/o AA	AA w/o Transfer	Voc. AA w/o Trans.	Cert. w/o Transfer	Discover Interests	Prepare Career	Advance Career	Maintain Cert./Lic.	Educ. Dev.	Improve Bas. Sk.	Complete H.S. Units	Undecided	Row Total
	#	#	#	#	#	#	#	#	#	#	#	#	#	#
BA & AA	300	10	20	20	5	15	15	15	0	0	0	0	0	400
BA w/o AA	20	200	10	30	0	0	20	10	0	0	10	0	0	300
AA w/o Transfer	30	10	200	10	5	5	10	10	0	0	10	5	5	400
Voc. AA w/o Trans.	5	5	10	150	0	5	5	15	0	5	0	0	0	200
Cert. w/o Transfer														
Discover Interests														
Prepare Career														
Advance Career														
Maintain Cert./Lic.														
Educ. Dev.														
Improve Bas. Sk.														
Complete H.S. Units														
Undecided														
Column Total	500	400	475	300										2000

Table 2

Percent of Students Who Choose an Admissions Goal Who Later Choose a Matriculation Goal

Admissions Goals	Matriculation Goals: BA & AA	BA w/o AA	AA w/o Transfer	Voc. AA w/o Trans.	Cert. w/o Transfer	Discover Interests	Prepare Career	Advance Career	Maintain Cert./Lic.	Educ. Dev.	Improve Bas. Sk.	Complete H.S. Units	Undecided	Row Total
	%	%	%	%	%	%	%	%	%	%	%	%	%	%
BA & AA	75	2	5	5	1	4	4	4	0	0	0	0	0	20
BA w/o AA	7	67	3	10	0	0	7	3	0	0	3	0	0	15
AA w/o Transfer	8	3	50	3	1	1	3	3	0	3	0	0	0	20
Voc. AA w/o Trans.	3	3	5	75	0	3	3	8	0	3	0	0	0	10
Cert. w/o Transfer														
Discover Interests														
Prepare Career														
Advance Career														
Maintain Cert./Lic.														
Educ. Dev.														
Improve Bas. Sk.														
Complete H.S. Units														
Undecided														
Column Total	25	20	24	15										100%

Comments

1. Comment on which admissions goals are chosen the most and least frequently. For example, one could note from the data that while 20% of the students want to go on to a BA after receiving an AA degree, only 10% want a certificate.

2. Comment on which matriculation goals are chosen the most and least frequently, from the bogus data, one could say that while 25% of students wish to obtain an BA degree after an AA, 15% are seeking a vocational AA without transferring.

3. Comment on the overall goal changes from the admissions goals to matriculation goals.

4. Comment on significant changes from a particular admissions goal to particular matriculation goal(s). For example, one could note from the fabricated data that 2% of the students who originally had the goal of getting a BA after an AA degree changed their goal to getting a BA without an AA degree after the matriculation process.

Discussion

Suggestions for points to cover in the Discussion section

1. *Interpretation of the findings*. Discuss which goals showed the most change. Discuss the overall rate of change. Discuss whether or not and why the matriculation process seemed to relate to change or clarification in student goals.

2. *Suggestions for further research*. You may want to suggest further research identifying the demographics associated with students who change their goals. What kind of students are most apt to change their goals? What would happen if another study had a control group in which students filled out a second set of goal choices but without the matriculation process? Over time, how many students attain their stated matriculation goals?

Technical Assistance

Contact person for this design:

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Available technical assistance includes consultation on design, execution, data analysis, and reporting.

DESIGN 9

Student Satisfaction With Matriculation

This study attempts to respond to state directives by surveying students about their access, level of awareness, and satisfaction with specific campus services related to the matriculation process. This design may also be used to demonstrate the impact of matriculation on colleges' services. The ability of students to make "wise educational choices" requires the use of services and the application of assistance and information they receive to their decision making.

An array of data will be generated with this survey regarding student satisfaction and use of campus services. If this is a first effort, we would expect that students who participated in matriculation and were exposed to matriculation services would show greater understanding and direction within the college than students who did not participate. If baseline recognition and satisfaction data already exist at the college, these measures may show positive increases as matriculation efforts are expanded to include more services and extended to more students.

It is recommended that participating colleges have all student matriculation services (i.e., admissions, assessment, orientation, counseling/advisement) in place, but it is not necessary to have all students fully participating in these services. In fact, if matriculation services do not reach all eligible students for reasons of budget and/or time constraints, this allows colleges the opportunity to have a naturally occurring comparison group in the research project. In this case, it is necessary to identify students who have received "full" matriculation services and those who have not.

The ability to input data into either a personal or mainframe computer is beneficial for this project. The study will create a data base which can be utilized over time for future evaluation studies. Availability of a statistical package on the computer is highly desirable. The capability to match survey information with student records through the campus mainframe is necessary only as an option for a different approach to the study. This study has many options, some of which would be helpful to integrate into surveys administered in alternate years.

Method

Design and development of survey instrument

This study will examine student perceptions and satisfaction with respect to matriculation services through data collected by a survey instrument. A complete survey can be developed from materials included with this design or colleges may elect to develop their own survey or individual survey questions based on locally identified interests. The survey should reflect input from the college's Matriculation Committee.

Attachment 1 provides sample survey questions to obtain basic demographic characteristics. Survey questionnaires where the respondent is anonymous tend to provide the researcher with more honest data. However, if the college has the resources to match survey responses to individual student records on the campus mainframe, greater analysis is possible. By asking for the student's identification number on the survey instrument, certain demographic and performance characteristics do not need to be asked within the survey as they will be available from the campus mainframe.

Attachments 2, 3, and 4 address the creation of evaluation questions and provide examples. Attachment 2 outlines suggested dimensions of satisfaction that apply to campus services if the college is developing its own survey form. Attachment 3 is an example of a short survey to determine level of recognition and satisfaction with campus services. Attachment 4 provides examples of questions for a more specific evaluation of matriculation services. Using all of the questions included in the attachments would produce a long survey instrument, not unmanageable, but perhaps unwelcome in the classroom. Care should be taken when designing your college's survey to ensure that the time needed for completion is reasonable.

Traditional sources of information for students can create "hidden controls" on your study population. Proper names of offices instead of informal names can create confusion (e.g., "Administration Building," may mean nothing to a student who refers to it as Smith Hall; when in doubt, use all known names of offices, including nicknames and abbreviations). If you have multiple sites for certain services, provide separate evaluation questions for each site, or have students indicate where they receive services (see Attachment 1, question 14).

If the college has established baseline information about student perceptions and satisfaction with support services (from ongoing research, special accreditation surveys, etc.), this project will update and broaden such perspectives. Repeat the questions that were asked in previous years in order to compare changes in responses over time.

Subjects

This study is designed as a classroom survey. Selecting the appropriate sample of your student body is essential to the collection of helpful information. Depending on resources, various approaches are possible. Knowledge of your curriculum and assistance from Data Processing in generating student profiles on different courses will assist in identifying a cross-section of classes to allow for a good sampling of the student body and a sufficient sample size on which to base your conclusions. All classes on a Tuesday or Wednesday during a specified morning hour and one early evening hour could be designated as the classes to be surveyed. Another recommended approach is to include primarily introductory classes, which have a dominance of freshman students, as the courses in which to administer the survey.

The "served" matriculants will need to be identified from the non-served students. The targeted student group will be the new students, the traditional "freshmen." If your selected subgroup population of new freshmen is under 500, you will want to do a random sample of at least 200 individuals (see *Sampling Guidelines* in Appendix B); if it is smaller, it is desirable to sample all of them. Remember, only a select proportion surveyed in the classrooms will be your "targeted" population.

Colleges may wish to identify selected subgroup populations within their student body. Comparisons among age, gender, and ethnic groups should be considered. You will need to compare the student characteristics of the sample and the college population. Age, gender, ethnicity, and educational goals should be comparable, and the study sample should not differ significantly from the targeted population.

Procedure

The survey will be administered in the classroom. It is intended that you survey students late in the term (within the week following second census). Care should be taken to involve the instructional faculty with the project. The President or other officers of the college should actively support the project at meetings and by sending a letter requesting participation. It would also be helpful if the survey only took 30 minutes or less to distribute, respond to, and collect so that classroom instruction is not disrupted for the entire time.

While data processing is likely to be involved in compiling the data generated by the survey, there are two options for the mechanical side of the data collection. The first is a survey where students can mark their answers with any writing implement on the document; these responses will need to be manually entered. The second option is to use a standard optically-read response sheet (which can be purchased in bulk) to accompany the survey instrument. While the second option makes inputting the data much faster and easier, it does require the use of No. 2 pencils.

Results

Organization of the Data

The initial format for the report should parallel the survey instrument with summary results instead of the blanks from which respondents chose (see Attachment 3). A computer will be able to summarize the responses. A statistical package will be able to generate more detailed information. See Attachment 3 for an example of recognition and satisfaction indices using that approach.

Examples for organizing the results could include graphs comparing the distributions of response by subgroups.

Analysis of the Data

Frequency counts and percentages will be calculated for each survey item.

If respondent identification is planned, a statistical package is beneficial in maximizing research possibilities. Use and satisfaction with services could be matched to assessment information and academic performance to develop counseling recommendations for students. Additionally, you can develop a data base for review after additional semesters of work by the students.

Discussion

Suggestions for points to cover in the Discussion section

1. *Interpretation of the findings.* Does the fully matriculated student use campus services more frequently, and with greater satisfaction and success than other students? Are there differences in use, satisfaction, and success related to age, ethnicity, gender, or educational goal?

2. *Limitations of the study.* Any survey instrument is only as good as the clarity of its questions, sampling representativeness, and student truthfulness. All of these factors should be discussed fully in committee. Also, it is recomended that your initial draft of the survey instrument be pilot tested on 10-20 students followed by a detailed discussion of the items. This can help overcome the usual limitations of most questionnaires. Surveys frequently only allow for "bare bones" responses. Have your committee check each item carefully to be sure you are getting the information desired.

Study Options

1. If you have different types of orientation and different sites for counseling, do a comparison of the use and satisfaction data to evaluate the effectiveness of the alternative delivery systems. The different versions of orientation and counseling will need to be indicated by the student on the survey instrument.

2. If you can match the survey to student records, do regression analyses with grades as the outcome variable, and assessment information and service utilization or satisfaction as the independent variables for different subgroups of the student body.

Technical Assistance

Contact person for this design:

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Available technical assistance includes consultation on design, execution, data analysis, and reporting.

ATTACHMENT 1

Demographic Information on Students

For a classroom survey, a short explanation and request for assistance should precede the questions. For example: The college needs information and opinions from students to evaluate and improve programs and services. Your responses are confidential and will not be revealed. We appreciate your cooperation. Please mark one answer for each question or fill in the blank.

1. When was your first term at ( ) College? ___ Fall ___ Winter ___ Spring

   Year: ___ 1990 ___ 1989 ___ 1988 ___ 1987 ___ 1986 ___ 1985 ___ 1984 ___ 1983 or before

2. What year did you graduate from high school? _____

3. How old are you? _____

4. How many units will you complete this term? _____

5. How many units have you completed at ( ) College *prior* to this term? _____

6. Gender: ____ Female _____ Male

7. What is your residential zip code? ___ ___ ___ ___ ___

8. Which best describes your ethnicity?
   Use the new MIS definitions (see Operational Definitions in Appendix A). You can elaborate to meet your specific needs.

9. Were you born in the United States? _____ Yes _____ No *(An option some colleges may desire.)*

10. Are you a citizen of the United States?_____ Yes _____ No *(An option some colleges may desire.)*

11. How many hours do you work each week? _____ None _____ 1 to 9
    _____ 10 to 19 _____ 20-29 _____ 30-39 _____ 40 or more

12. Which of the following best describes your current educational goal?
    Use the new MIS categories (see Operational definitions in Appendix A).

(Be sure to use your college's appropropriate terms for the following two questions)

13. Have you worked with a counselor to develop an educational plan? _____ Yes _____ No

14. Which one of the following offices do you use most frequently for assistance in selecting courses and planning your education?

    _____ Have never had assistance
    _____ Counseling Office
    _____ Career Center
    _____ Disabled Student Center
    _____ Financial Aid Office
    _____ EOP/S
    _____ Other:_____ (please indicate)

ATTACHMENT 2

Suggested Dimensions of Satisfaction

Appendices 3 and 4 are examples of "awareness and satisfaction" survey instruments. While these formats and forms can be used, staff and faculty involved with the evaluation and study of matriculation may well desire to develop their own instrument. In doing so, the following dimensions are suggested for gathering helpful evaluation information.

---

1. Frequency of use:

   Frequently used services which impact a great number of students may be the most important "service centers" to focus on in terms of later strategies for improvement.

2. Perceived "usefulness" or "satisfaction" with service; a three or five category scale is easy to use:

   -- Never visited/used
   -- Somewhat useful
   -- Quite useful

   or

   -- Never visited/used
   -- Not at all useful
   -- Somewhat useful
   -- Useful
   -- Very useful

3. Awareness/knowledge of services:

   In order to check for one form of response bias, throw in offices/services that do not exist at your college to check reliability of answers (e.g., Student Typing Services).

4. Assessment of student goals:

   -- use MIS categories (See Appendix A)

5. Areas of usefulness/satisfaction:

   -- attitude of staff
   -- relation of information to educational goals
   -- quality/interest/comprehensibility of written information
   -- quality/interest/comprehensibility of verbal information
   -- hours of operation
   -- availability of staff
   -- ease of setting appointments/other measures of access
   -- ease of finding office
   -- accessibility of office (critical for special needs students and night time students)

6. Recommendations for improvements:

   -- hours of operation
   -- shorter lines
   -- more staff
   -- telephone service
   -- more knowledgeable staff
   -- availability of interpreters

ATTACHMENT 3

Campus Services Questionnaire

This is an example of a satisfaction survey which includes both recognition and satisfaction indicies. Responses in categories B through E "recognize" the service unit, and the ratio of D and E responses to the sum of C, D, and E responses (see scale below) gives you a satisfaction index. For example, if the numeric responses for the first item were:

100 A	100 B	50 C	150 D	100 E
(20%)	(20%)	(10%)	(30%)	(20%)

Recognition is 80% or .80 (B + C + D + E or .20 + .10 + .30 + .20);
Use is 60% or .60 (C + D + E or .10 + .30 + .20); and the
Satisfaction index is .83 (D + E/C + D + E or .30 + .20/ .10 + .30 + .20).

Use the names of services/service units as your students will identify them. Some of these will not apply to your college.

Please indicate which one of the following statements best describes your experiences with each campus service.

Use the following scale:
(A) Have never heard of it
(B) Heard of it, but have never used it
(C) Have used it, but was not satisfied
(D) Have used it, and found it helpful
(E) Have used it, and found it very helpful

Student Computer Center	____A	____B	____C	____D	____E
Campus Library	____A	____B	____C	____D	____E
Learning Center	____A	____B	____C	____D	____E
Writing Lab	____A	____B	____C	____D	____E
Math-Science Center	____A	____B	____C	____D	____E
Tutorial Center	____A	____B	____C	____D	____E
Nursing Learning Center	____A	____B	____C	____D	____E
Testing/Assessment Center	____A	____B	____C	____D	____E
Job Placement Center	____A	____B	____C	____D	____E
Academic Counseling Center	____A	____B	____C	____D	____E
EOPS Office	____A	____B	____C	____D	____E
Transfer Center	____A	____B	____C	____D	____E
Health Center	____A	____B	____C	____D	____E
Financial Aid Office	____A	____B	____C	____D	____E
Disabled Student Services	____A	____B	____C	____D	____E
Admissions and Records	____A	____B	____C	____D	____E
Career Center	____A	____B	____C	____D	____E

ATTACHMENT 4

Component Evaluation

These are questions for a more comprehensive evaluation of matriculation service areas.

Admissions

1. How would you rate the convenience of the Admissions process?
   ___ Excellent ___ Good ___ Fair ___ Poor ___ No Opinion

2. How would you rate the encouragement given you by the Admissions Office personnel?
   ___ Excellent ___ Good ___ Fair ___ Poor ___ No Opinion

3. How would you rate the efficiency of registering for classes?
   ___ Excellent ___ Good ___ Fair ___ Poor ___ No Opinion

4. How long did it take you to register for classes this term?
   ___ 15 minutes or less
   ___ 15 to 30 minutes
   ___ 30 to 45 minutes
   ___ 45 to 60 minutes
   ___ 60 to 90 minutes
   ___ more than 90 minutes

Orientation

5. Did you participate in a campus orientation program or orientation class?
   ___ Yes ___ No (If No, go to question #10)

6. How long was your orientation session? OR *(Optional - Individual colleges should choose appropriate responses)*
   Which of the following types of orientation did you go through?

7. How would you rate the helpfulness of the information given at your Orientation session?
   ___ Excellent ___ Good ___ Fair ___ Poor ___ No Opinion

8. Did attending the Orientation session influence you to visit other campus services?
   ___ Yes ___ No

9. Did attending the Orientation session help you in choosing your classes?
   ___ Yes ___ No

Assessment

10. Have you undergone any testing at this college to determine your reading, writing and math skills?
    ___ Yes ___ No (If No, go to question #14)

11. Do you believe your course placement in English was appropriate?
    ___ Yes ___ No ___ Undecided/Not applicable

12. Do you believe your course placement in math was appropriate?
    ___ Yes ___ No ___ Undecided/Not applicable

13. Did a member of the college staff explain your results to you?
    ___ Yes ___ No

14. Have you completed any tests at the college to determine your vocational/career interests?
    ___ Yes ___ No (If No, go to question #16)

15. How would you rate the helpfulness of the testing you have done in selecting courses or programs at the college?
    ___ Excellent ___ Good ___ Fair ___ Poor ___ No Opinion

Counseling/Advisement

16. Have you met with a counselor?

_____ Yes _____ No (If No, go to question #22)

17. Did the counselor assist you in choosing courses and programs?

_____ Yes _____ No

18. How would you rate the helpfulness of the counselor you have seen?

____ Excellent ____ Good ____ Fair ____ Poor ____ No Opinion

19. Did your counseling appointment help clarify your educational goals and how to achieve them?

_____ Yes _____ No

20. Did your counselor help you understand about course and basic skills prerequisites?

_____ Yes _____ No

21. Did your counselor refer you to other campus services?

_____ Yes _____ No

Overall/Goals

22. When did you first decide upon a specific educational goal to pursue at this college?

_____ Before applying to the college
_____ During my orientation session
_____ During my first term at the college
_____ During my second, third term, etc.
_____ I'm still undecided

23. Have you chosen or changed your educational goal?

____ Yes _____ No (If No, go to question #25)

24. What factors led you to identify or change your goal? (Check all that apply)

_____ The results of the English and math assessments
_____ The results of vocational tests I took
_____ Discussions with faculty in my courses
_____ Discussions with counselors
_____ Discussions with other staff
_____ Did not do as well as expected in the major originally selected
_____ Found I did not enjoy the courses in the major originally selected
_____ Discovered an area of study that I enjoyed more
_____ Lack of job opportunities in the area originally selected
_____ Job/Career opportunities in another area were of greater interest to me
_____ The college did not offer a program/course in my area of interest
_____ Family responsibilities
_____ Job responsibilities
_____ Other: _____
(please state reason)

Follow-up

25. What will your student status be next term?

_____ Continuing at this college
_____ Continuing at a 4-year college
_____ Continuing at another community college
_____ Will have completed my educational goal
_____ Temporary leave, but will return
_____ Unsure at this time

APPENDIX A

Matriculation Local Research Options Project Operational Definitions

Term	Definition
Successful	Grades of A, B, C, and CR represent success.
Nonsuccessful	D, F, NC, W, and I grades represent nonsuccess. Grades of In Progress (IP), Report Delayed (RD), and other notations of no grade of record should be excluded (e.g., Drop-DR).
Success Rate	Number of successful units divided by the total number of successful plus nonsuccessful units. Multiply this proportion by 100 to convert the number to a percentage.
Persistence	A student persists to the subsequent term when any grade (excluding no shows) appears on the transcript for the subsequent term.
Persistence Rate	Out of an original specified group, it is the percentage of students who persisted to the subsequent term.
Retention	A student is retained in a class when the transcript shows a grade of A, B, C, CR, D, or I on the student's transcript at the end of the term.
Retention Rate	The total number of enrolled units with grade notations of A, B, C, CR, D, or I divided by the total number of enrolled units with grade notations of A, B, C, CR, D, F, NC, W, and I, excluding grades of RD, IP and other notations indicating no grade of record (e.g., DR) Multiply this proportion by 100 to convert the number to a percentage.
Matriculated Student	For purposes of this project, a matriculated student is one who has received the following services: admissions, assessment, orientation, and counseling/ advisement. These services must have been rendered prior to the second week of the term. Students enrolled in an on-going matriculation class would be considered a matriculated student. This definition should not be construed to be the official definition of a "matriculated" student.
Exempt Student	An exempt student is one who is admitted but not required to participate in the assessment, orientation, or counseling/advisement process as specified in the local district policy of exemption.
Drop-out	A student who, within a given term, has officially dropped all units prior to the end of the term.
Remedial Reading	Non AA-applicable reading courses designed to prepare students for college-level reading.
Remedial Writing	English and ESL writing courses two or more levels below Freshman Composition (English 1A).
Remedial Math	Math Courses in any department below Beginning or Introductory Algebra.

Ethnic Status	Asian Black Non-Hispanic Filipino Hispanic American Indian/Alaskan Native	Other Non-white Pacific Islander White Non-Hispanic Unknown/Non-Respondent

These categories are from the June '89 MIS Data Element Dictionary (SB05). Colleges can use the expanded MIS version for their local study although we would like the data to be collapsed for state-wide reporting. Colleges also may add categories of ethnic groups for their own local use.

Use these categories for ethnic breakdowns if possible, otherwise, use the ones currently in use in your district.

Age

Less than 20 years old
20 - 24 years old
25 - 29 years old
30 - 49 years old
50 or more years old

Credit Load

0.1 - 5.9 units
6.0 - 11.9 units
12.0 or more units

Educational Goals

The educational goals (SB14 and SM01 from the June '89 MIS Dictionary) to be used in the project are as follows:

Obtain a Bachelor's Degree after completion of an Associate's Degree - BA & AA
Obtain a Bachelor's Degree without completing an Associate's Degree - BA w/o AA
Obtain a two-year Associate's Degree without transfer - AA w/o Transfer
Obtain a two-year vocational degree without transfer - Voc. AA w/o Transfer
Obtain a vocational Certificate without transfer - Cert. w/o Transfer
Discover/formulate career interests, plans, goals - Discover Interests
Prepare for a new career (acquire job skills) - Prepare Career
Advance in current job/career (update job skills) - Advance Career
Maintain certificate or license (e.g., Nursing, Real Estate) - Maintain Cert./Lic.
Educational development (intellectual, cultural) - Educ. Dev.
Improve basic skills in English, reading or math - Improve Bas. Sk.
Complete credits for high school diploma or GED - Complete H.S. units
Undecided on goal - Undecided

Other Demographic Indicators: Work hours, Gender, etc.

Use the definitions and breakdowns found in the June '89 MIS Data Element Dictionary so we can have uniformity in reporting.

APPENDIX B

Sampling Guidelines

The primary concern in any sampling procedure is to be confident that the sample selected is representative of the population from which the sample is drawn. "Sampling error" is the degree to which the data from a random sample deviates from data that would be obtained from the whole population.

The first step in sample size selection is to determine the "confidence level" desired. The confidence level typically used in social science research is .05. This means that there is only a 5% probability that observed group differences are solely due to chance factors or sampling error.

Generally, larger samples tend to be more representative of the total population. Nevertheless, overly large samples are unnecessary because it will not significantly decrease the sampling error (sampling error is inversely related to the square of the sample size).

For experiments involving random assignment of subjects to treatments, a sample size of at least 100 per treatment group will reveal any treatment effects that are large enough to matter educationally. For surveys or other studies dealing with population proportions, Table 1 presents the sample sizes required in order for sample proportions to be within .05 of the true population proportions.

When sampling is used, it is advisable to gather certain demographic information about the sample of students (e.g., ethnicity, age, sex, educational goal) to ensure that the sample is indeed representative of the college population on these characteristics. It is suggested that frequency distributions of these demographic data be presented for the sample (and if possible, for the college) in the Results section of each study that uses sampling.

When observations are made about subgroups of the total sample, very small subgroups are likely to misrepresent their subpopulation. It may be necessary to increase overall sample size to insure that each subgroup contains at least 30-50 students. Alternatively, stratified sampling approaches may be used. Stratified sampling entails random sampling within a subgroup population to ensure that you have the appropriate proportion of the subgroup represented within the total sample.

Table 2 is a list of random numbers to help select your sample. An alternative method that is approximately random is to select every Nth name (until the necessary sample size has been reached) where N equals population size divided by sample size (e.g., population = 2000; sample = 322; select every 6th name from the defined population).

When sampling techniques are used with survey research, you will need to take into account the expected response rate. Generally, classroom surveys have a 70% response rate; therefore, the size of the sample will need to be increased by 30%.

TABLE 1

Choosing a Sample Size at a 95% Confidence Level

TABLE FOR DETERMINING NEEDED SIZE *S* OF A RANDOMLY CHOSEN SAMPLE FROM A GIVEN FINITE POPULATION OF *N* CASES SUCH THAT THE SAMPLE PROPORTION *p* WILL BE WITHIN ± .05 OF THE POPULATION PROPORTION *P* WITH A 95 PERCENT LEVEL OF CONFIDENCE[1]

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note: *N* is population size; *S* is sample size.

1. Krejcie, R. V. and Morgan, D. W. Determining sample size for research activities, *Educational and Psychological Measurement*, 1970, 30, 607–610.

TABLE 2

Random Sampling Techniques

Obtain a list of all members of your population. Assign each member of the population a number (e.g., 1,2,3,etc.). Determine your desired sample size (N). Now enter the table of random numbers and arbitrarily select a column and row as your starting number. Combine rows if you need 3 or more digits. For example, suppose you want to select 200 students from a population of 10,000 and you pick 10 09 as a starting point. The next student selected should be 7325, then 3376, etc.

10	09	73	25	33	76	52	01	35	86	34	67	35	48	76	80	95	90	91	17	39	29	27	49	45
37	54	20	48	05	64	89	47	42	96	24	80	52	40	37	20	63	61	04	02	00	82	29	16	65
08	42	26	89	53	19	64	50	93	03	23	20	90	25	60	15	95	33	47	64	35	08	03	36	06
99	01	90	25	29	09	37	67	07	15	38	31	13	11	65	88	67	67	43	97	04	43	62	76	59
12	80	79	99	70	80	15	73	61	47	64	03	23	66	53	98	95	11	68	77	12	17	17	68	33
66	06	57	47	17	34	07	27	68	50	36	69	73	61	70	65	81	33	98	85	11	19	92	91	70
31	06	01	08	05	45	57	18	24	06	35	30	34	26	14	86	79	90	74	39	23	40	30	97	32
85	26	97	76	02	02	05	16	56	92	68	66	57	48	18	73	05	38	52	47	18	62	38	85	79
63	57	33	21	35	05	32	54	70	48	90	55	35	75	48	28	46	82	87	09	83	49	12	56	24
73	79	64	57	53	03	52	96	47	78	35	80	83	42	82	60	93	52	03	44	35	27	38	84	35
98	52	01	77	67	14	90	56	86	07	22	10	94	05	58	60	97	09	34	33	50	50	07	39	98
11	80	50	54	31	39	80	82	77	32	50	72	56	82	48	29	40	52	42	01	52	77	56	78	51
83	45	29	96	34	06	28	89	80	83	13	74	67	00	78	18	47	54	06	10	68	71	17	78	17
88	68	54	02	00	86	50	75	84	01	36	76	66	79	51	90	36	47	64	93	29	60	91	10	62
99	59	46	73	48	87	51	76	49	69	91	82	60	89	28	93	78	56	13	68	23	47	83	41	13
65	48	11	76	74	17	46	85	09	50	58	04	77	69	74	73	03	95	71	86	40	21	81	65	44
80	12	43	56	35	17	72	70	80	15	45	31	82	23	74	21	11	57	82	53	14	38	55	37	63
74	35	09	98	17	77	40	27	72	14	43	23	60	02	10	45	52	16	42	37	96	28	60	26	55
69	91	62	68	03	66	25	22	91	48	36	93	68	72	03	76	62	11	39	90	94	40	05	64	18
09	89	32	05	05	14	22	56	85	14	46	42	75	67	88	96	29	77	88	22	54	38	21	45	98
91	49	91	45	23	68	47	92	76	86	46	16	28	35	54	94	75	08	99	23	37	08	92	00	48
80	33	69	45	98	26	94	03	68	58	70	29	73	41	35	53	14	03	33	40	42	05	08	23	41
44	10	48	19	49	85	15	74	79	54	32	97	92	65	75	57	60	04	08	81	22	22	20	64	13
12	55	07	37	42	11	10	00	20	40	12	86	07	46	97	96	64	48	94	39	28	70	72	58	15
63	60	64	93	29	16	50	53	44	84	40	21	95	25	63	43	65	17	70	82	07	20	73	17	90
61	19	69	04	46	26	45	74	77	74	51	92	43	37	29	65	39	45	95	93	42	58	26	05	27
15	47	44	52	66	95	27	07	99	53	59	36	78	38	48	82	39	61	01	18	33	21	15	94	66
94	55	72	85	73	67	89	75	43	87	54	62	24	44	31	91	19	04	25	92	92	92	74	59	73
42	48	11	62	13	97	34	40	87	21	16	86	84	87	67	03	07	11	20	59	25	70	14	66	70
23	52	37	83	17	73	20	88	98	37	68	93	59	14	16	26	25	22	96	63	05	52	28	25	62
04	49	35	24	94	75	24	63	38	24	45	86	25	10	25	61	96	27	93	35	65	33	71	24	72
00	54	99	76	54	64	05	18	81	59	96	11	96	38	96	54	69	28	23	91	23	28	72	95	29
35	96	31	53	07	26	89	80	93	54	33	35	13	54	62	77	97	45	00	24	90	10	33	93	33
59	80	80	83	91	45	42	72	68	42	83	60	94	97	00	13	02	12	48	92	78	56	52	01	06
46	05	88	52	36	01	39	09	22	86	77	28	14	40	77	93	91	08	36	47	70	61	74	29	41
32	17	90	05	97	87	37	92	52	41	05	56	70	70	07	86	74	31	71	57	85	39	41	18	38
69	23	46	14	06	20	11	74	52	04	15	95	66	00	00	18	74	39	24	23	97	11	89	63	38
19	56	54	14	30	01	75	87	53	79	40	41	92	15	85	66	67	43	68	06	84	96	28	52	07
45	15	51	49	38	19	47	60	72	46	43	66	79	45	43	59	04	79	00	33	20	82	66	95	41
94	86	43	19	94	36	16	81	08	51	34	88	88	15	53	01	54	03	54	56	05	01	45	11	76

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